Williams®

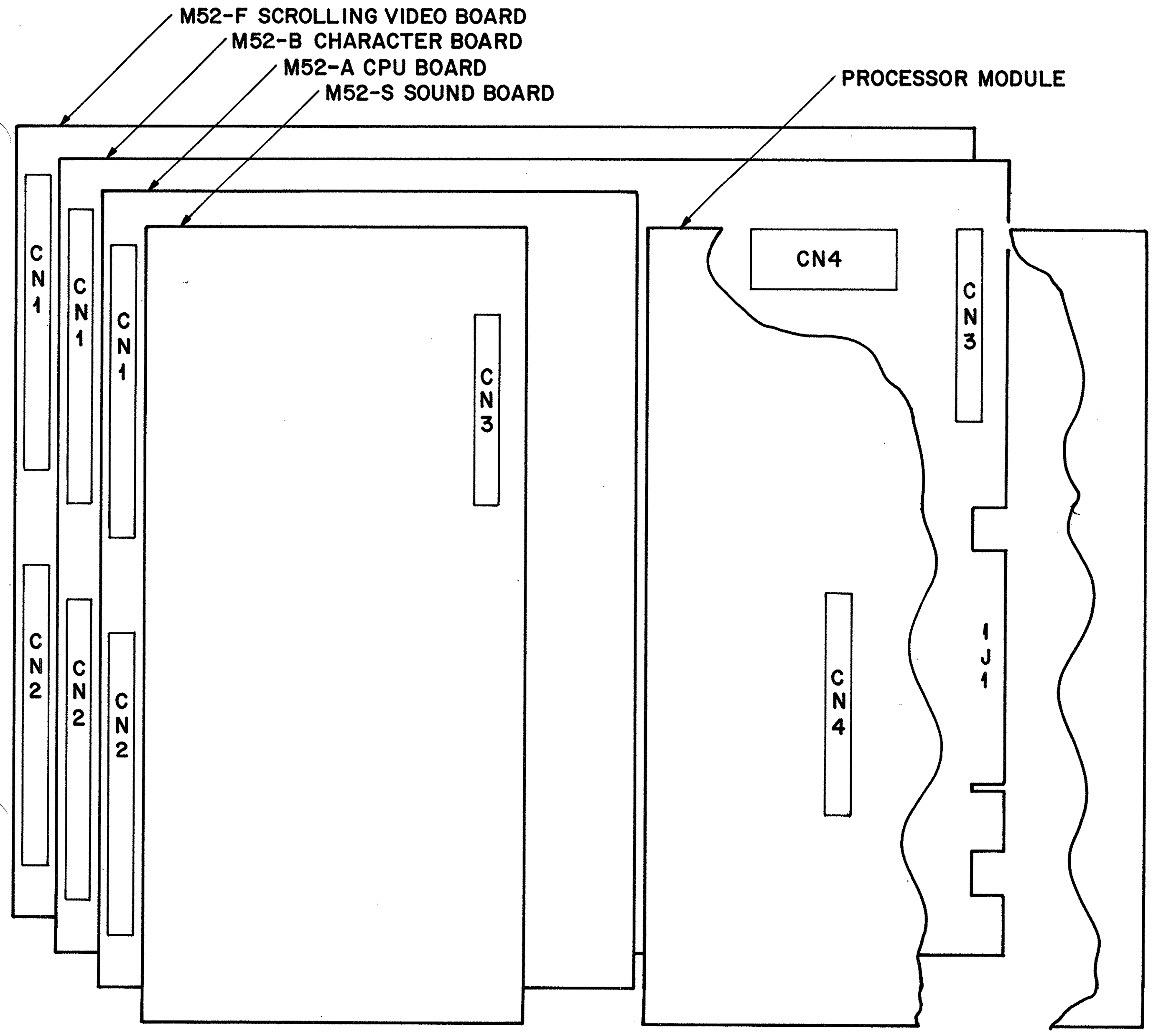
Drawing Set

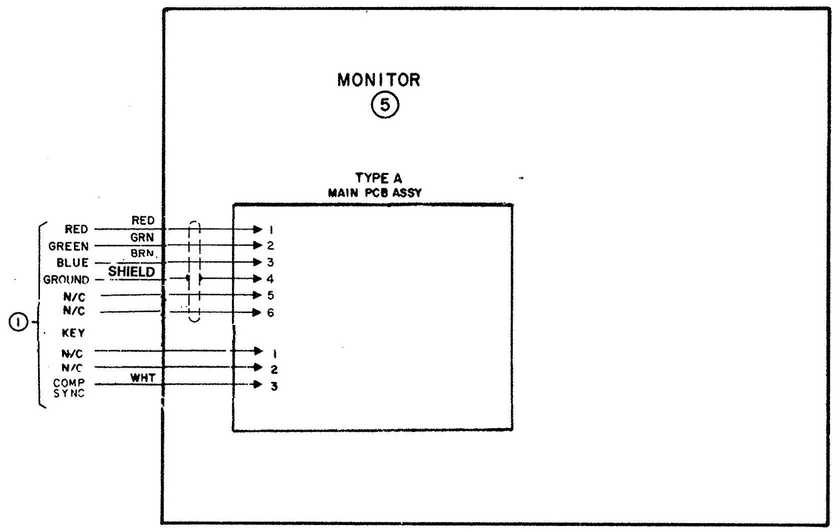
MOTORACE -USA

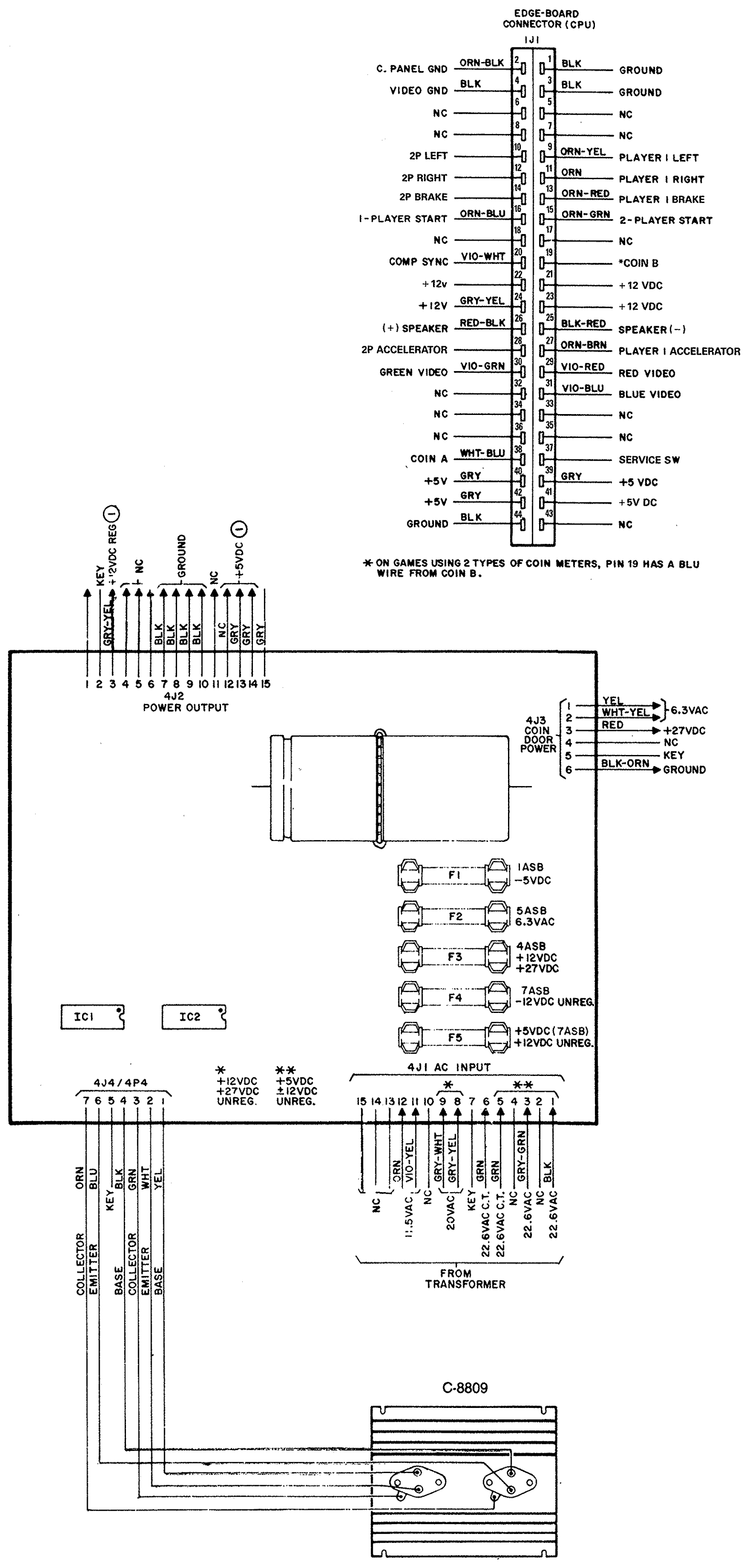
LOGIC AND
SCHEMATIC DIAGRAMS



CONTENTS







C-8809 heat sink assembly

Part No.	Description
5162-09425	2N6057, Transistor, NPN
5161-09552	2N3055, Transistor, NPN
5705-09684	Heat Sink
5700-09445	Socket, TO3
5701-09562	Thermal Pad
4006-01003-10	Machine Screw 6-32x5/8"

DIP SWITCH SETTINGS

DIP SWITCH NO. 1

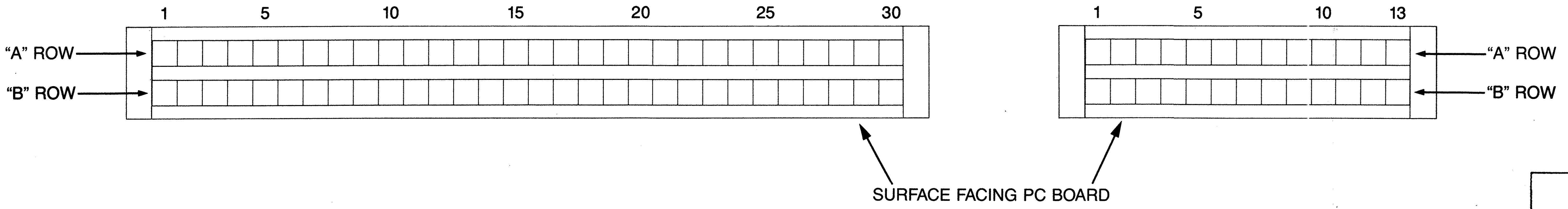
ADJUSTMENT	OPTIONS	SWITCH NUMBER 1	2	3	4	5	6	7	8
• RECOMMENDED SETTINGS		ON	OFF	OFF	ON	OFF	OFF	OFF	OFF
COIN MODE 1*	6 PLAYS/1 COIN 5 PLAYS/1 COIN 4 PLAYS/1 COIN					OFF ON OFF	OFF ON ON	ON OFF OFF	ON ON ON
•	3 PLAYS/1 COIN 2 PLAYS/1 COIN 1 PLAY/1 COIN					ON OFF OFF	OFF OFF OFF	OFF OFF OFF	ON ON OFF
	1 PLAY/2 COINS 1 PLAY/3 COINS 1 PLAY/4 COINS					ON OFF ON	OFF ON ON	OFF OFF OFF	OFF OFF OFF
	1 PLAY/5 COINS 1 PLAY/6 COINS FREE PLAY					OFF ON ON	OFF OFF ON	ON ON ON	OFF OFF ON
*COIN MODE 2 — CHUTE A	1 PLAY/1 COIN 1 PLAY/2 COINS 1 PLAY/3 COINS					OFF ON OFF	OFF OFF ON		
	FREE PLAY					ON	ON		
B	2 PLAYS/1 COIN 3 PLAYS/1 COIN 5 PLAYS/1 COIN 6 PLAYS/1 COIN							OFF ON OFF ON	OFF OFF ON ON
PERCENT OF FUEL LOST IN COLLISION •	8.3% Low 11.7% 15.0% 18.3% Max	OFF ON OFF ON	OFF OFF ON ON						
FUEL • CONSUMPTION	LOW HIGH			OFF ON					
†CONTINUED PLAY •	NO YES				OFF ON				

DIP SWITCH NO. 2

ADJUSTMENT	OPTIONS	SWITCH NUMBER 1	2	3	4	5	6	7	8
•RECOMMENDED SETTINGS		OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF
**FLIP PICTURE •	NO YES	OFF ON							
CABINET TYPE •	TABLE UPRIGHT		OFF ON						
COIN MODE SETTINGS FOR DIP SWITCH 1 •	COIN MODE 1 COIN MODE 2			OFF ON					
UNIT OF DISTANCE •	MILE KILOMETER				OFF ON				
FREEZE PICTURE •	NO YES					OFF ON			
DEMO MODE •	NO YES							OFF ON	
TEST MODE •	NO YES								OFF ON
**SWITCH 6 (not used) •	NO						OFF		

•Recommended settings are indicated with bullets (•).
*For games with a single coin selector or two selectors of the same value, switch 3 on Dip Switch 2 must be turned OFF. For games with selectors for two different coin values, switch 3 must be turned ON.
**Switches 4 and 6 of Dip Switch #2 MUST BE SET TO OFF.
†Permits a player to continue a game at the same point where he left off (on the previous coin.)

CONNECTORS CN1 & CN2 / CONNECTOR CN3



Connector CN1

PIN NO.	DESCRIPTION	PIN NO.	DESC.
1A	6 MHz	16A	VE2
1B	†ANPR	16B	GND
2A	6 MHz	17A	VE4
2B	N.C.	17B	GND
3A	7 HB	18A	VE8
3B	N.C.	18B	GND
4A	7 HB	19A	VE16
4B	†CPR	19B	GND
5A	HBLB	20A	VE32
5B	BLUE	20B	GND
6A	HBLB	21A	VE64
6B	RED	21B	GND
7A	VBLB	22A	VE128
7B	GND	22B	GND
8A	VBLB	23A	DB0
8B	GND	23B	HE1
9A	VB1	24A	DB1
9B	GND	24B	HE2
10A	VB128	25A	DB2
10B	GND	25B	HE4
11A	GREEN	26A	DB3
11B	GND	26B	HE8
12A	C-FLIP 1	27A	DB4
12B	GND	27B	HE16
13A	C-FLIP 2	28A	DB5
13B	GND	28B	HE32
14A	FLIP	29A	DB6
14B	GND	29B	HE64
15A	VE1	30A	DB7
15B	GND	30B	HE128

†ANPR = ALPHA NUMERIC PRIORITY
†CPR = CHARACTER PRIORITY

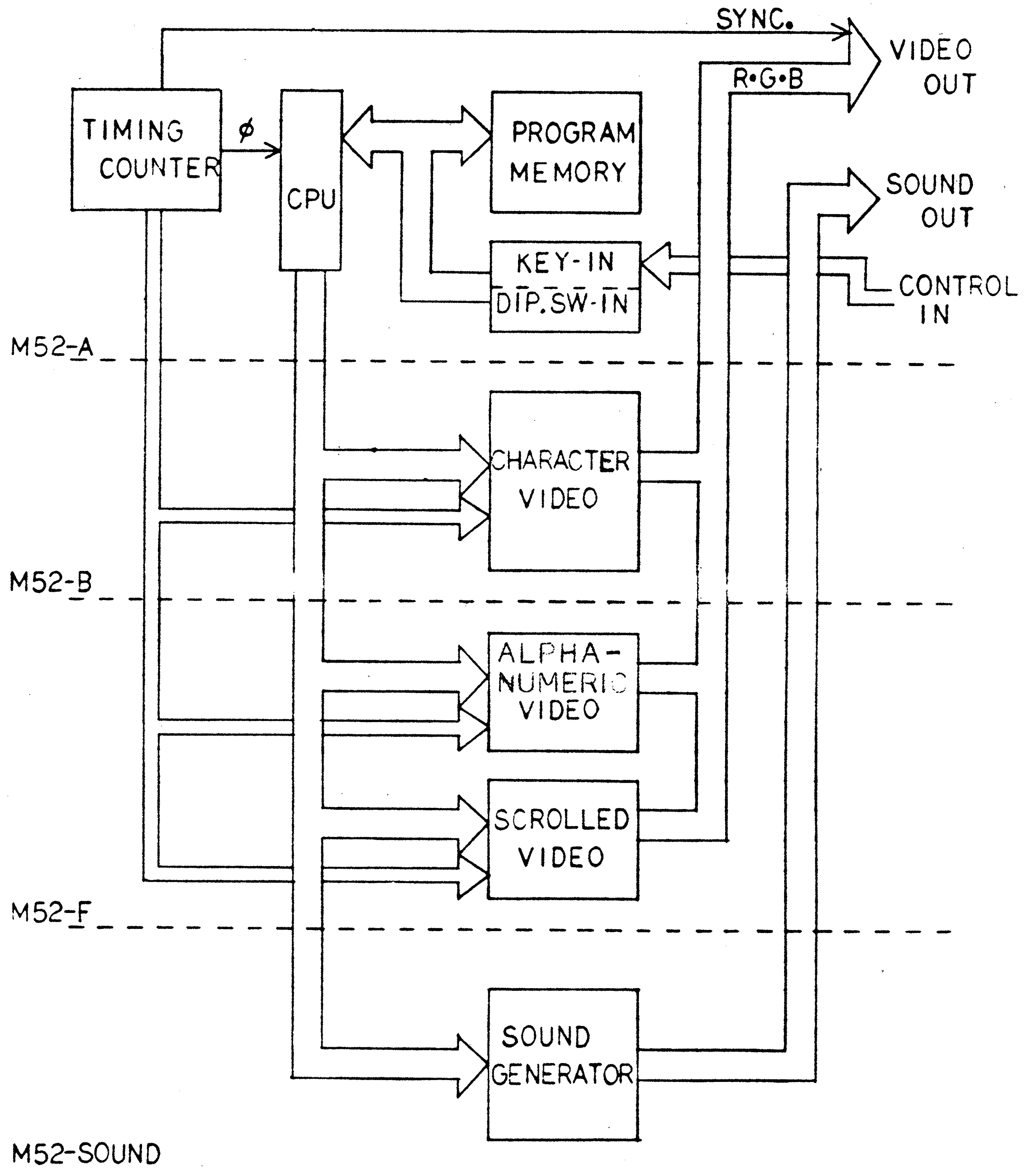
Connector CN2

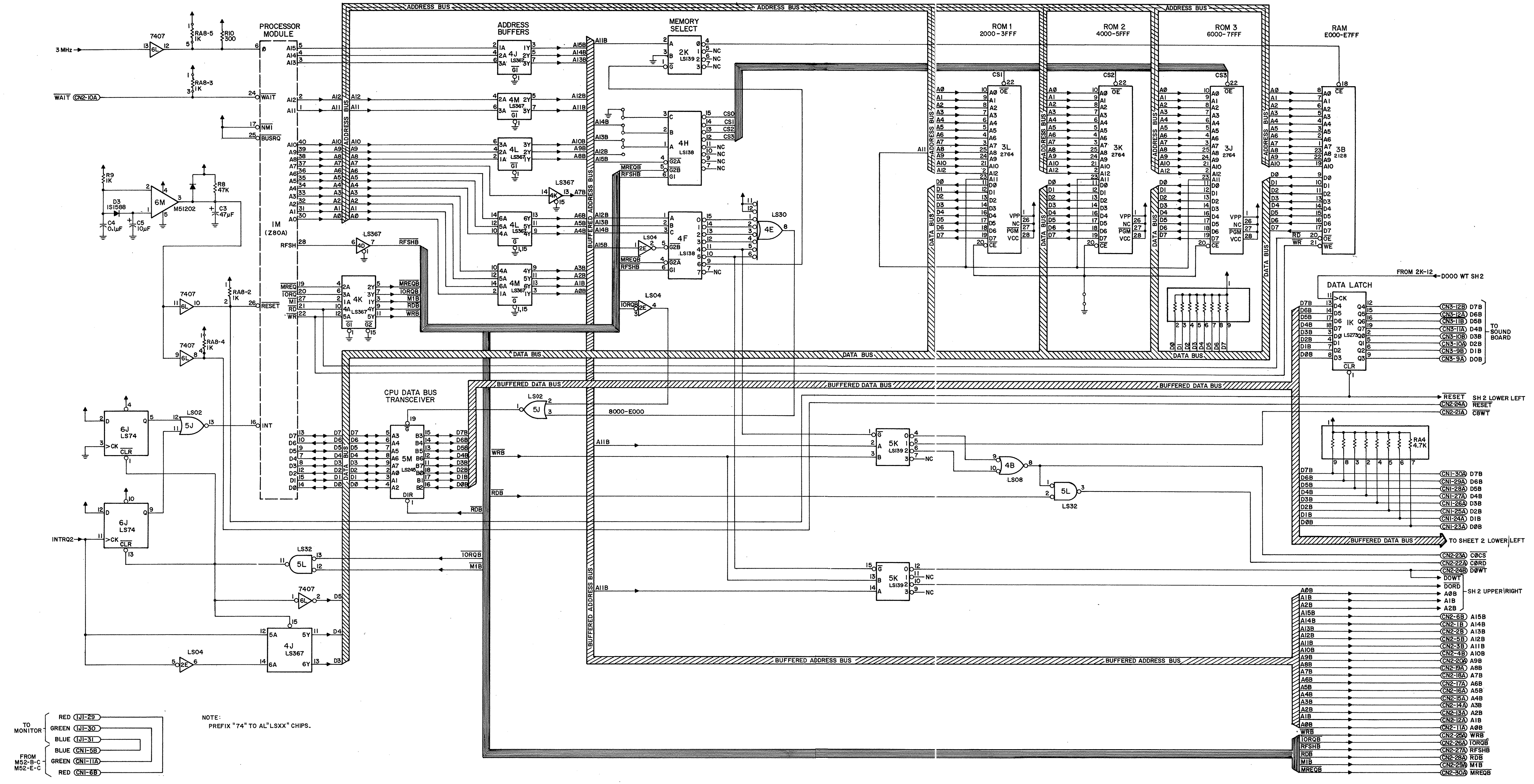
PIN NO.	DESCRIPTION	PIN NO.	DESC.
1A	HB1	16A	AB5
1B	AB14	16B	+5V
2A	HB2	17A	AB6
2B	AB13	17B	+5V
3A	HB4	18A	AB7
3B	AB11	18B	+5V
4A	HB8	19A	AB8
4B	AB10	19B	+5V
5A	HB16	20A	AB9
5B	AB12	20B	+5V
6A	HB32	21A	C8WT
6B	AB15	21B	+5V
7A	HB64	22A	C000RD
7B	+5V	22B	+5V
8A	HB128	23A	C000CS
8B	+5V	23B	V256
9A	HB256	24A	RESET
9B	+5V	24B	DOWT
10A	WAIT	25A	WRB
10B	+5V	25B	H30
11A	AB0	26A	IORQB
11B	+5V	26B	†CPR*
12A	AB1	27A	RFSHB
12B	+5V	27B	3DIM
13A	AB2	28A	RDB
13B	+5V	28B	NOT USED
14A	AB3	29A	M1B
14B	+5V	29B	NOT USED
15A	AB4	30A	MREQB
15B	+5V	30B	NOT USED

†CPR* = CHARACTER PRIORITY*

Connector CN3

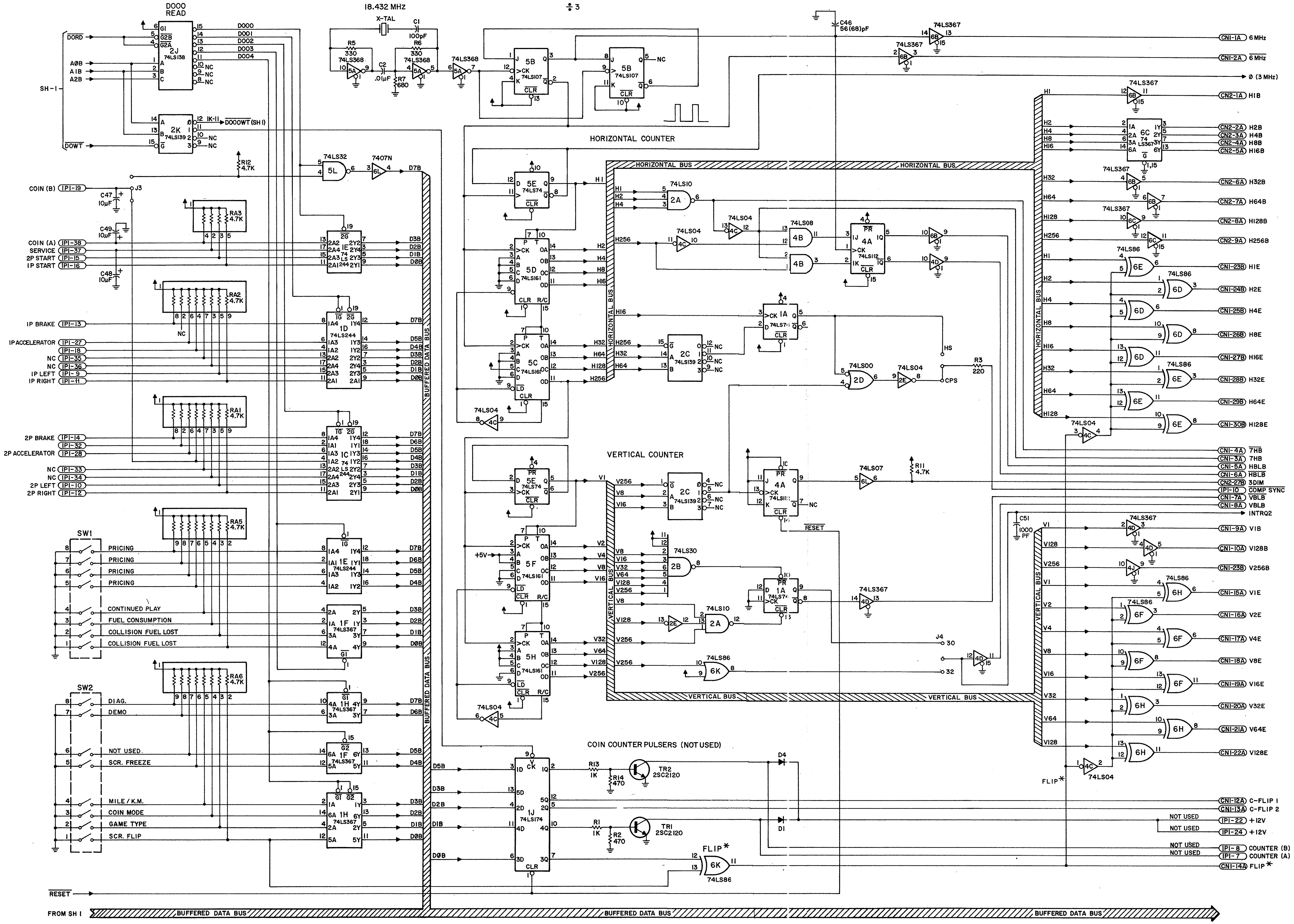
PIN NO.	DESCRIPTION
1A	SP+
1B	SP+
2A	SP-
2B	SP-
3A	+12V
3B	+12V
4A	+5V
4B	GND
5A	+5V
5B	GND
6A	+5V
6B	GND
7A	NOT USED
7B	NOT USED
8A	NOT USED
8B	NOT USED
9A	D0
9B	D1
10A	D2
10B	D3
11A	D4
11B	D5
12A	D6
12B	D7
13A	NOT USED
13B	NOT USED



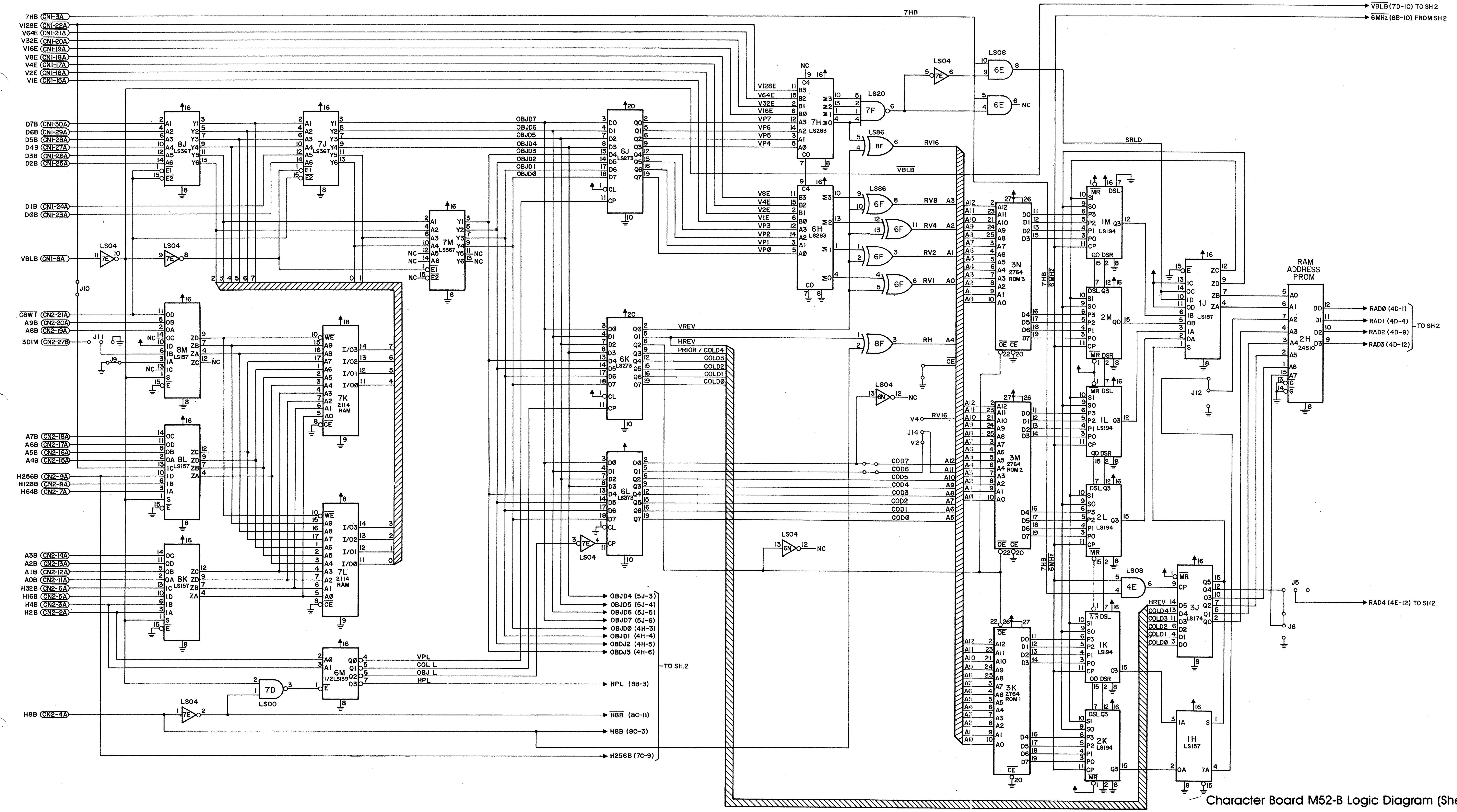


NOTE:
PREFIX "74" TO AL "LSXX" CHIPS.

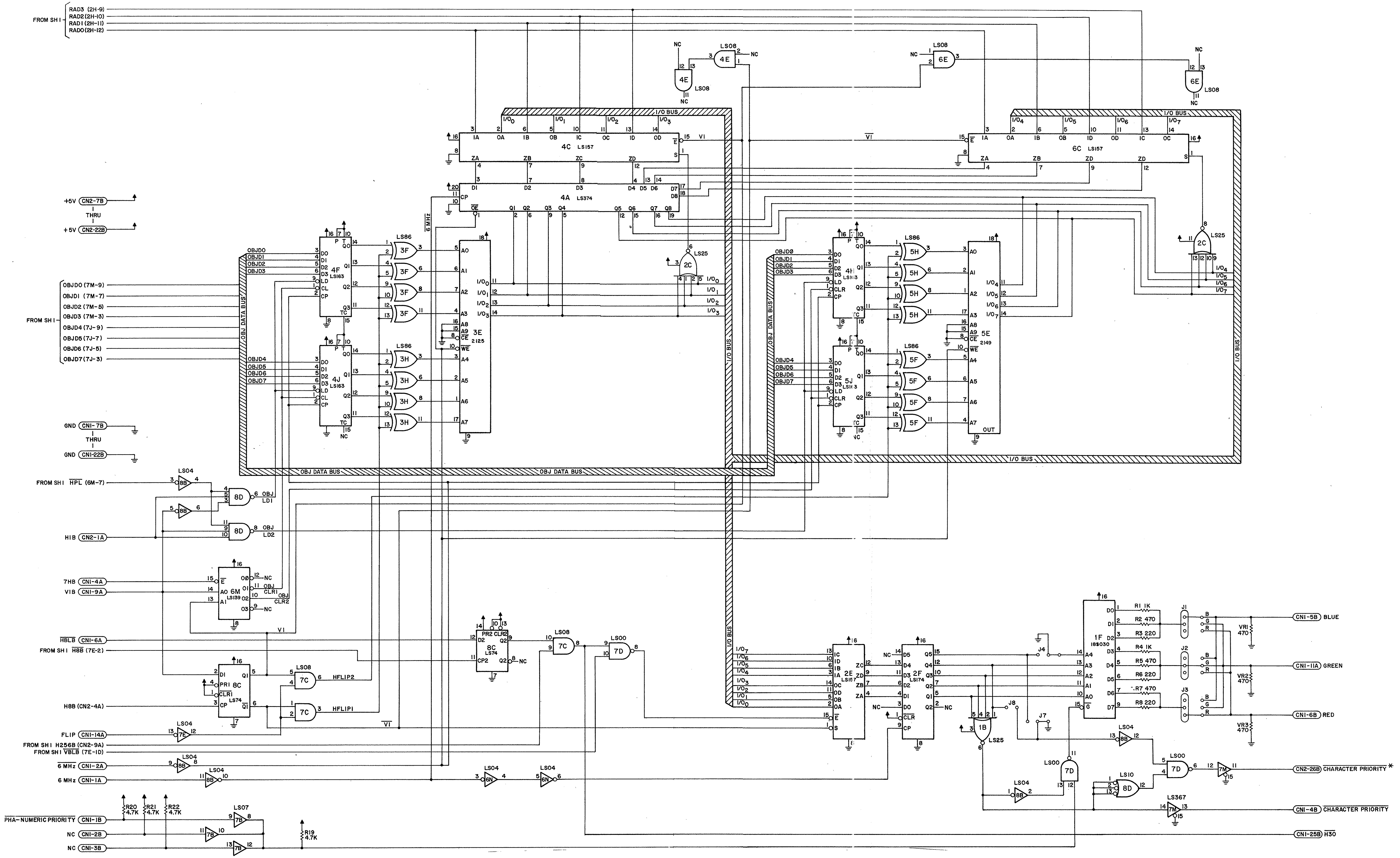
CPU Board M52-A Logic Diagram (Sheet 1 of 2)



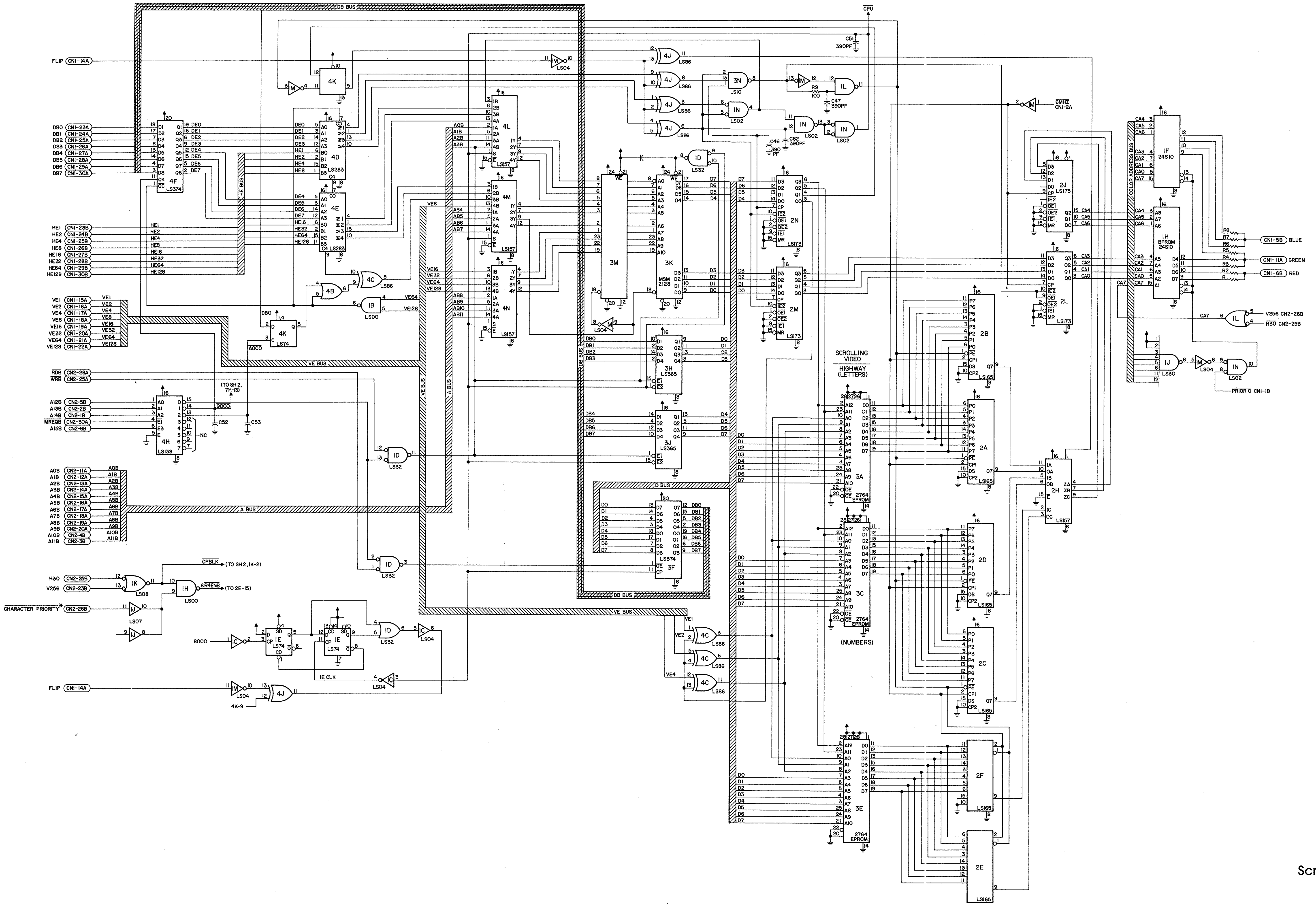
CPU Board M52-A Logic Diagram (Sheet 2 of 2)

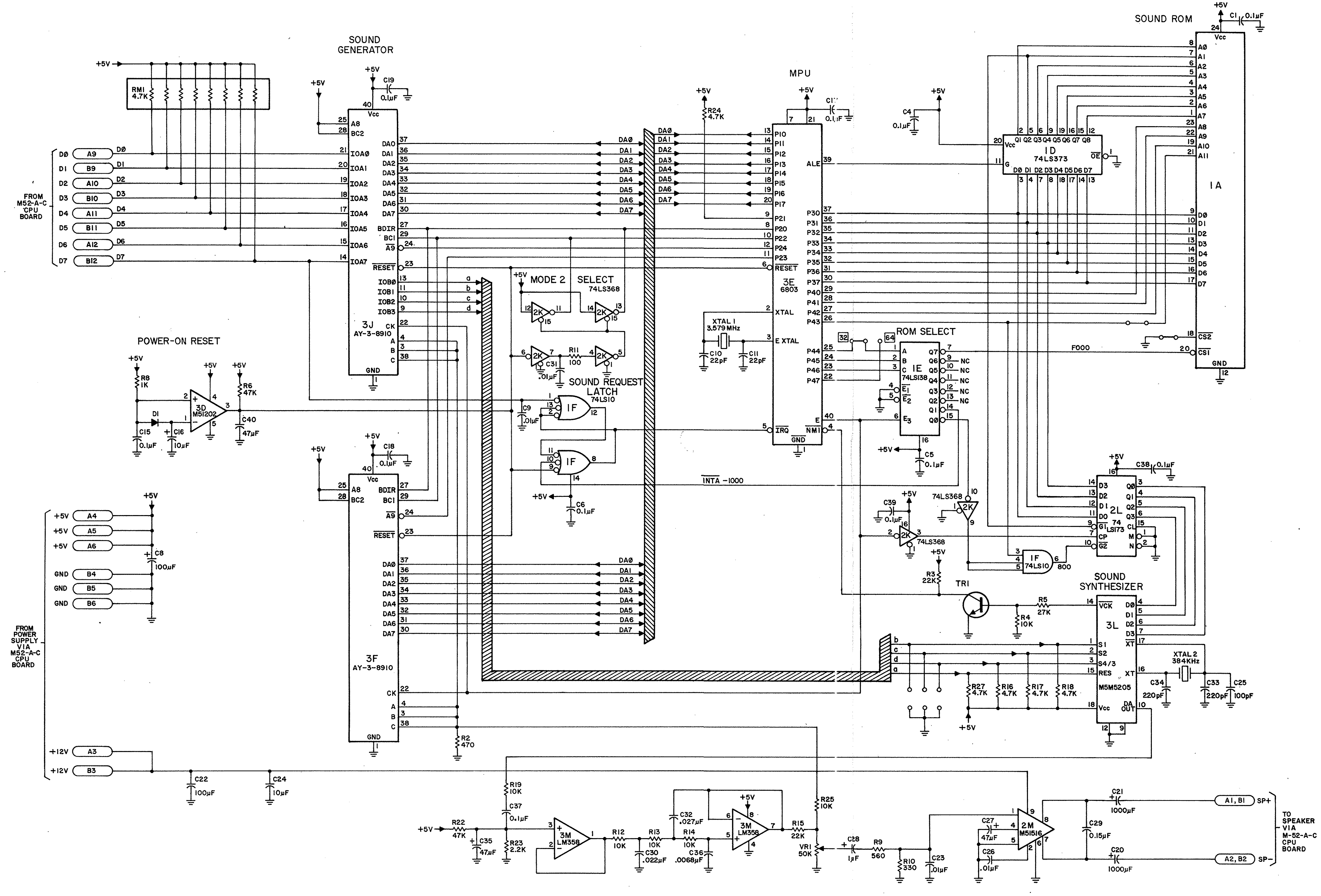


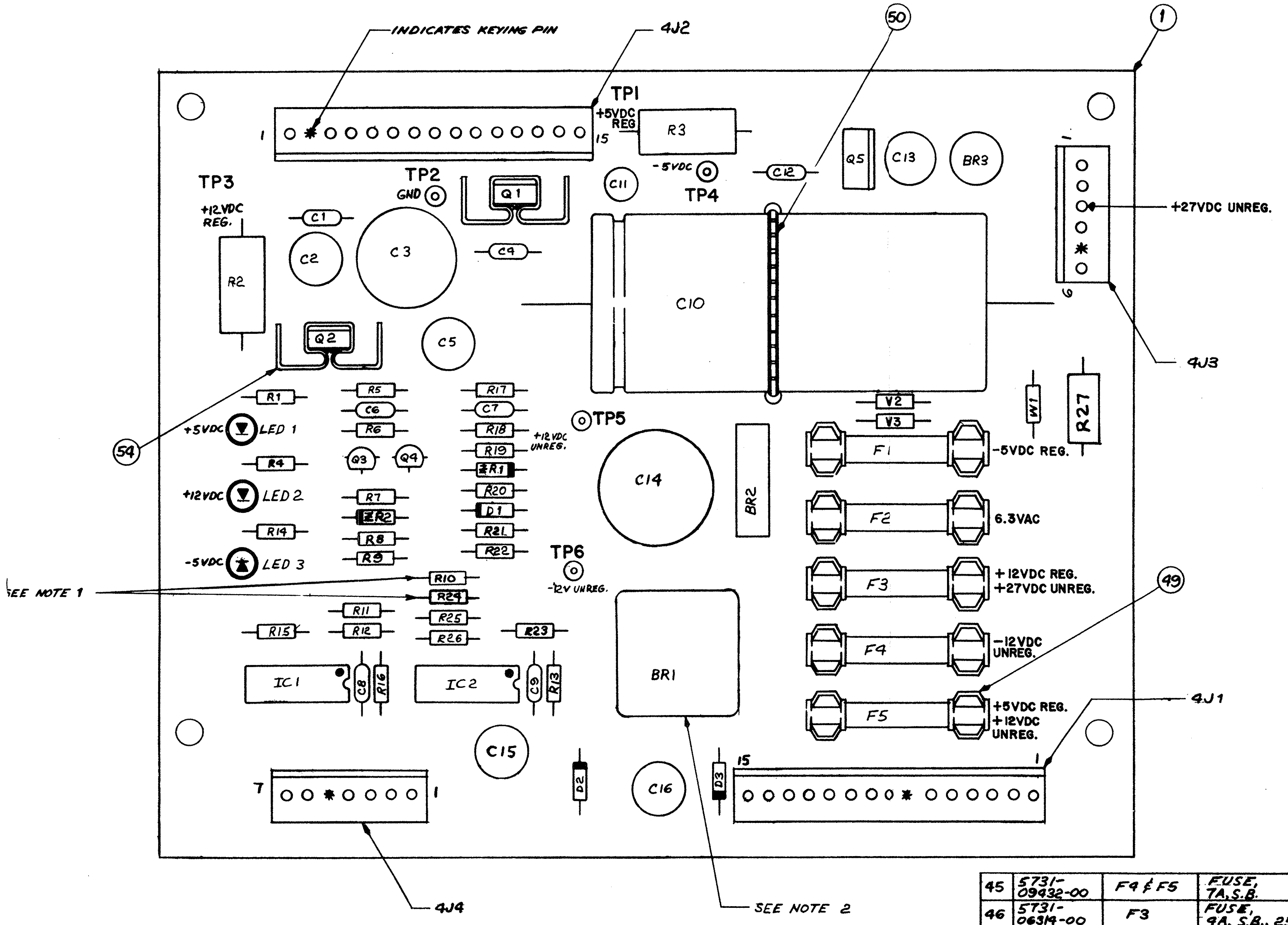
Character Board M52-B Logic Diagram (Sheet 1 of 2)



Character Board M52-B Logic Diagram (Sheet 2 of 2)


DB BUS
VE BUS
HE BUS
A BUS
D BUS
COLOR ADDRESS BUS
CPU
FLIP CN1-14A
DB0 CN1-23A
DB1 CN1-24A
DB2 CN1-25A
DB3 CN1-26A
DB4 CN1-27A
DB5 CN1-28A
DB6 CN1-29A
DB7 CN1-30A
HE1 CN1-23B
HE2 CN1-24B
HE4 CN1-25B
HE8 CN1-26B
HE16 CN1-27B
HE32 CN1-28B
HE64 CN1-29B
HE128 CN1-30B
VE1 CN1-15A
VE2 CN1-16A
VE4 CN1-17A
VE8 CN1-18A
VE16 CN1-19A
VE32 CN1-20A
VE64 CN1-21A
VE128 CN1-22A
RDB CN2-28A
WRB CN2-25A
A12B CN2-5B
A13B CN2-2B
A14B CN2-1B
MREQB CN2-30A
A15B CN2-6B
H30 CN2-25B
V256 CN2-23B
CHARACTER PRIORITY CN2-26B
CPBLK (TO SH 2, 1K-2)
R4ENB (TO 2E-15)
(TO SH 2, 7H-13)
6MHZ CN1-2A
CN1-5B BLUE
CN1-11A GREEN
CN1-6B RED
V256 CN2-26B
H30 CN2-25B
PRIOR 0 CN1-1B
SCROLLING VIDEO
HIGHWAY (LETTERS)
(NUMBERS)
2764 EPROM
MSM 2128
LS374
LS283
LS157
LS86
LS10
LS02
LS04
LS74
LS00
LS32
LS138
LS365
LS173
LS175
LS165
LS08
LS07
LS30
24S10
BPROM 24S10
C51 390PF
C47 390PF
C62 390PF
R9 100
IE CLK
8000
A000
4K-9


SOUND GENERATOR
SOUND ROM
MPU
MODE 2 SELECT
SOUND REQUEST LATCH
ROM SELECT
POWER-ON RESET
SOUND SYNTHESIZER
3J AY-3-8910
3F AY-3-8910
3E 6803
1A
1D 74LS373
1E 74LS138
2L 74LS173
3L M5M5205
3D M51202
2M M51516
3M LM358
FROM M52-A-C CPU BOARD
FROM POWER SUPPLY VIA M52-A-C CPU BOARD
TO SPEAKER VIA M-52-A-C CPU BOARD
XTAL 1 3.579 MHz
XTAL 2 384KHz
INTA -1000
F000



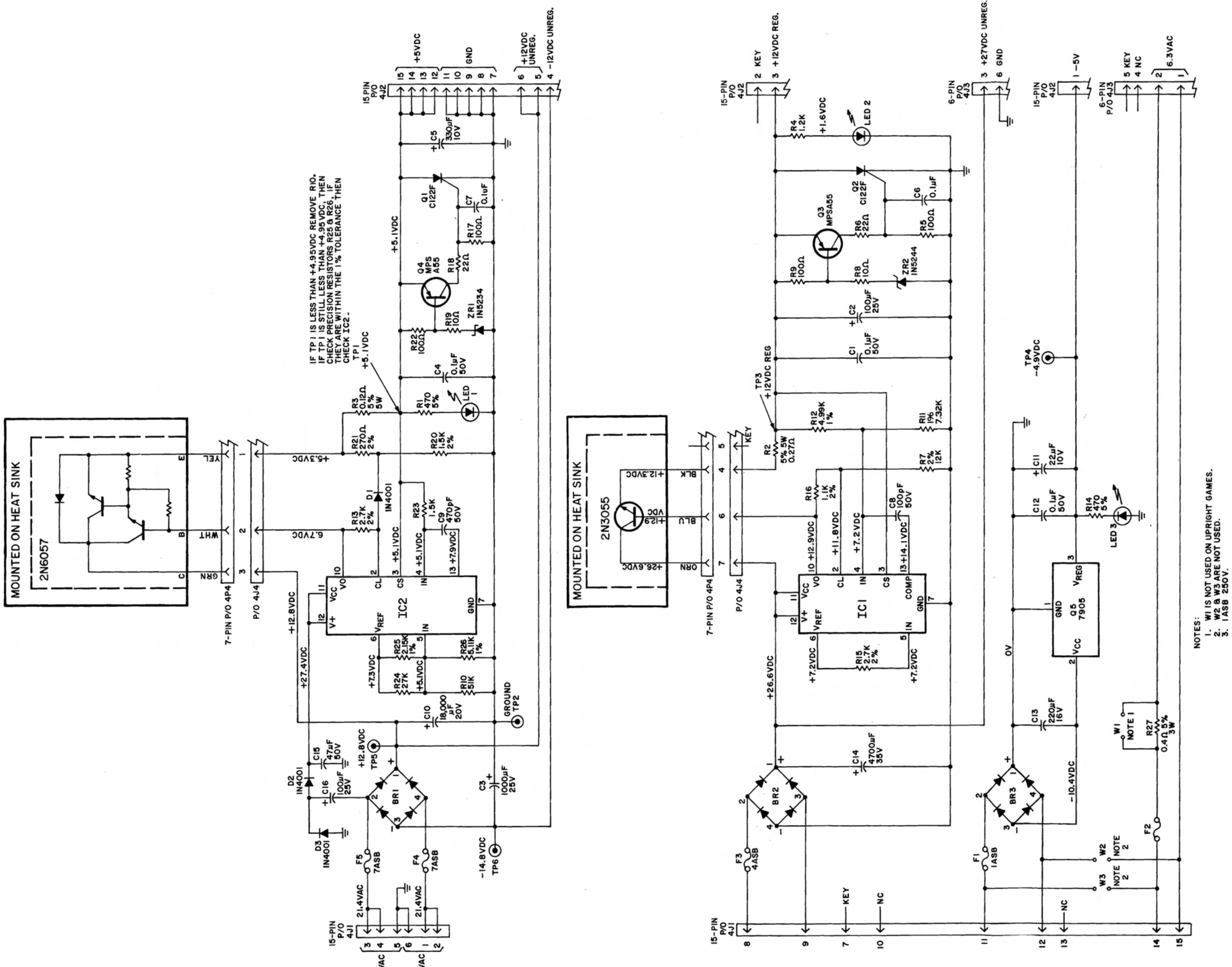
NOTES

1. REMOVE R10 IF +5VDC IS LESS THAN 4.95 VDC.
2. BR1 MUST BE MOUNTED 1/8" ABOVE SURFACE OF BOARD.

BILL OF MATERIAL

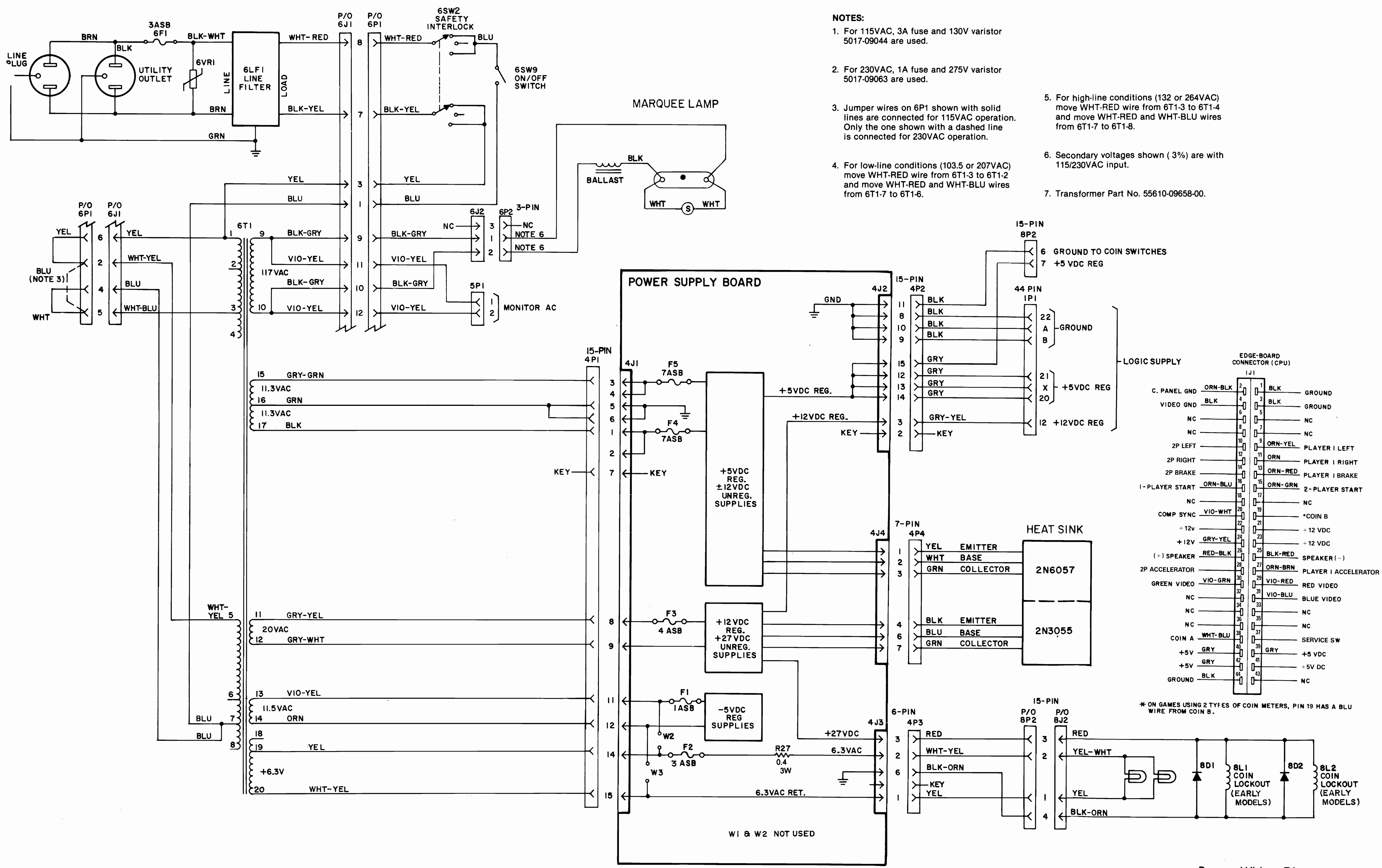
ITEM NO.	PART NO.	PART DESIGNATION	DESCRIPTION	REQ'D NO.
1	5773-09679-00		BARE P.C. BOARD	1
2	5010-09085-00	R23	RESISTOR, 1.5K 5%, 1/4W	1
3	5010-09541-00	R13, R15	RESISTOR, 2.7K 2%, 1/4W	2
4	5010-09508-00	R21	RESISTOR, 870Ω 2%, 1/4 W	1
5	5010-09428-00	R20	RESISTOR, 1.5K 2%, 1/4 W	1
6	5010-09509-00	R16	RESISTOR, 1.1K 2%, 1/4 W	1
7	5010-09510-00	R7	RESISTOR, 12K 2%, 1/4 W	1
8	5010-09314-00	R4	RESISTOR, 1.2K 5%, 1/4 W	1
9	5010-09416-00	R1, R14	RESISTOR, 470Ω 5%, 1/4W	2
10	5013-09542-00	R11	RESISTOR, 7.32K 1%, 1/4 W	1
11	5013-09927-00	R12	RESISTOR, 4.99K 1%, 1/4W	1
12	5013-09426-00	R25	RESISTOR, 2.15K 1%, 1/4 W	1
13	5012-09429-00	R3	RESISTOR, .12Ω 5%, 5W	1
14	5012-09512-00	R2	RESISTOR, .27Ω 5%, 5W	1
15	5012-09037-00	R27	RESISTOR, 0.4Ω 5%, 3W	1
16	5013-09665-00	R26	RESISTOR, 5.11K 1%, 1/4 W	1
17	5010-09434-00	R6, R18	RESISTOR, C.F. 22Ω ±5% 1/4W	2
18	5010-09036-00	R5, R9, R17 & R22	RESISTOR, C.F. 100Ω ±5% 1/4W	4
19	5010-09039-00	R8, R19	RESISTOR, C.F. 10Ω ± 5%, 1/4W	2
20	5010 09534-00	W1	RESISTOR, 0Ω	1
21	5043-08996-00	C6, C7	CAPACITOR, 0.1 μf CERAMIC +80% -20% 50V	2
22	5040-09421-00	C2, C16	CAPACITOR, 100MFD, 25V RADIAL +50% -10%	2
23	5040-09422-00	C15	CAPACITOR, 47 MFD, 50V RADIAL +50% -10%	1
24	5040-09420-00	C3	CAPACITOR, 1000 MFD. 25V RADIAL +75% -10%	1
25	5040-09419-00	C10	CAPACITOR, 18,000MFD 20V AXIAL +75% -10%	1
26	5040-09423-00	C5	CAPACITOR, 330 MFD 10V RADIAL +50% -10%	1
27	5040-09504-00	C14	CAPACITOR 4700MFD 35V RADIAL +50% -10%	1
28	5043-09446-00	C1, C4 & C12	CAPACITOR .1MFD 50V AXIAL Z5U -20 +80%	3
29	5043-08065-00	C9	CAPACITOR 470PFD 50V AXIAL X7R ± 10%	1
30	5043-09492-00	C8	CAPACITOR 100 PFD 50V AXIAL S2L ± 5%	1
31	5040-09506-00	C13	CAPACITOR 220MFD 16V RADIAL +50% -10%	1
32	5040-09493-00	C11	CAPACITOR 22MFD 10V RADIAL +50% -10%	1
33	5070-06258-00	D1, D2 & D3	DIODE, 1N4001	3
34	5075-09406-00	ZR1	ZENER, 1N5234 ± 5% (6.2V)	1
35	5075-09662-00	ZR2	ZENER 1N5244 ± 5% (14V)	1
36	5190-09430-00	Q3, Q4	TRANSISTOR, MPS A55	2
37	5130-09661-00	Q1, Q2	SCR 8 AMP, 100V	2
38	5250-09515-00	Q5	VOLTAGE REGULATOR, 7905	1
39	5460-09424-00	IC1, IC2	VOLTAGE REGULATOR, 723	2
40	5100-09090-00	BR1	BRIDGE RECTIFIER, 35 AMP, 200V	1
41	5100-09513-00	BR2	BRIDGE RECTIFIER, 4.0A, 50V	1
42	5100-09514-00	BR3	BRIDGE RECTIFIER, 1.0A, 50V	1
43	5671-09018-00	LED1, LED2, LED3	LED, RED	3
44	5824-09298-00	TP1 — TP6	TERMINAL # 1502-1 (TEST POINT)	4
45	5731-09432-00	F4 & F5	FUSE, 7A, S.B.	2
46	5731-06314-00	F3	FUSE, 4A, S.B., 250V	1
47	5731-06569-00	F1	FUSE, 1A, S.B. 250V	1
48	5731-09651-00	F2	FUSE, 5A, S.B. 250V	1
49	5732-09178-00		FUSEHOLDER,	10
50	03-7520		TIE WRAP	1
51	5791-09074-00	4J1 & 4J2	HEADER, 15 PIN 09-65-1151	2
52	5791-09032-00	4J3	HEADER, 6 PIN 09-65-1061	1
53	5791-09497-00	4J4	HEADER, 7 PIN 09-65-1071	1
54	5705-09663-00		HEAT SINK	2
	5705-09688-00		HEAT SINK	0
55	5010-09682-00	R10	RESISTOR C.F. 51K ± 5% 1/4W	1
56	5010-09324-00	R24	RESISTOR, C.F. 27K, ±5% 1/4W	1

Ⓐ



10

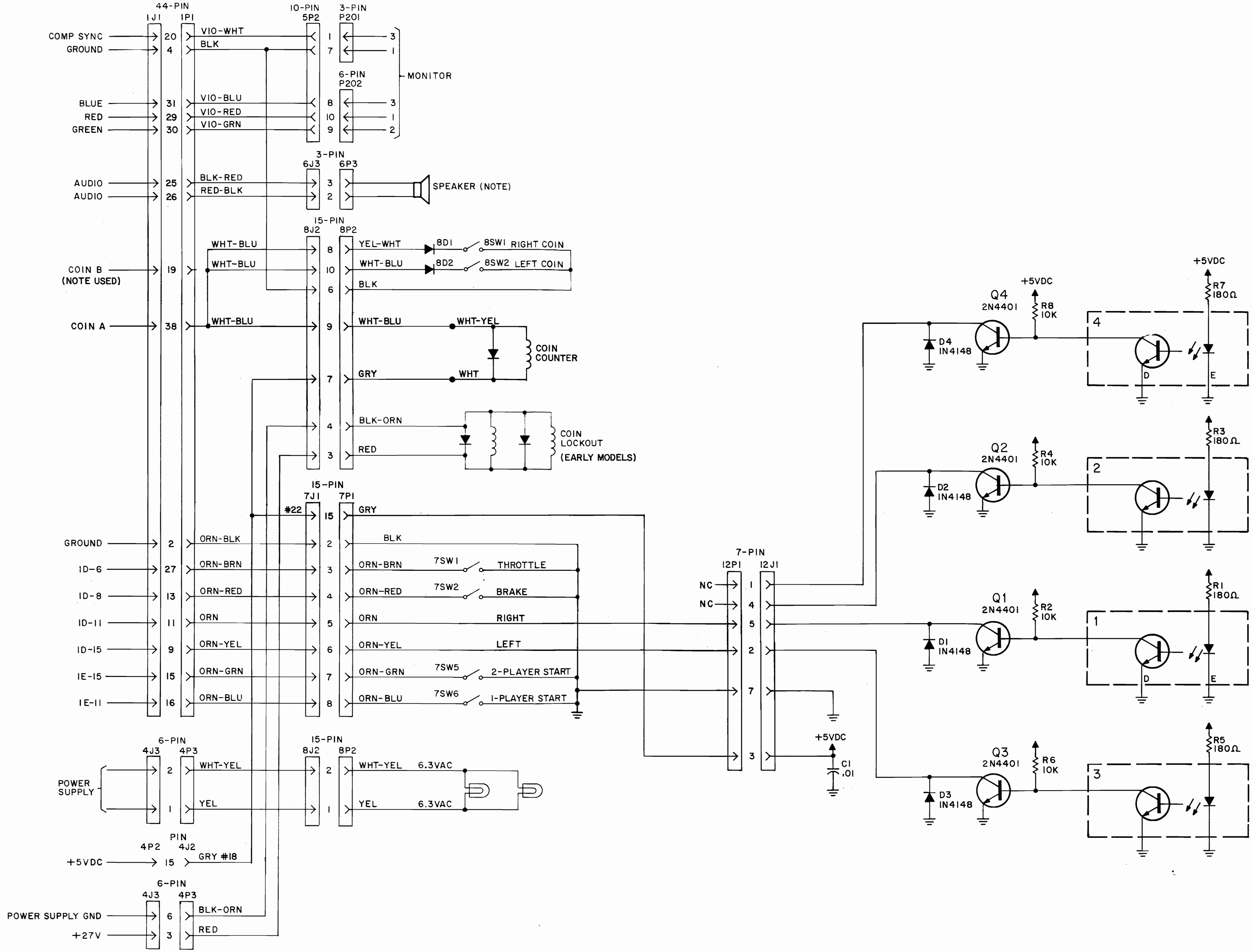
D-8784 Power Supply Board Schematic Diagram



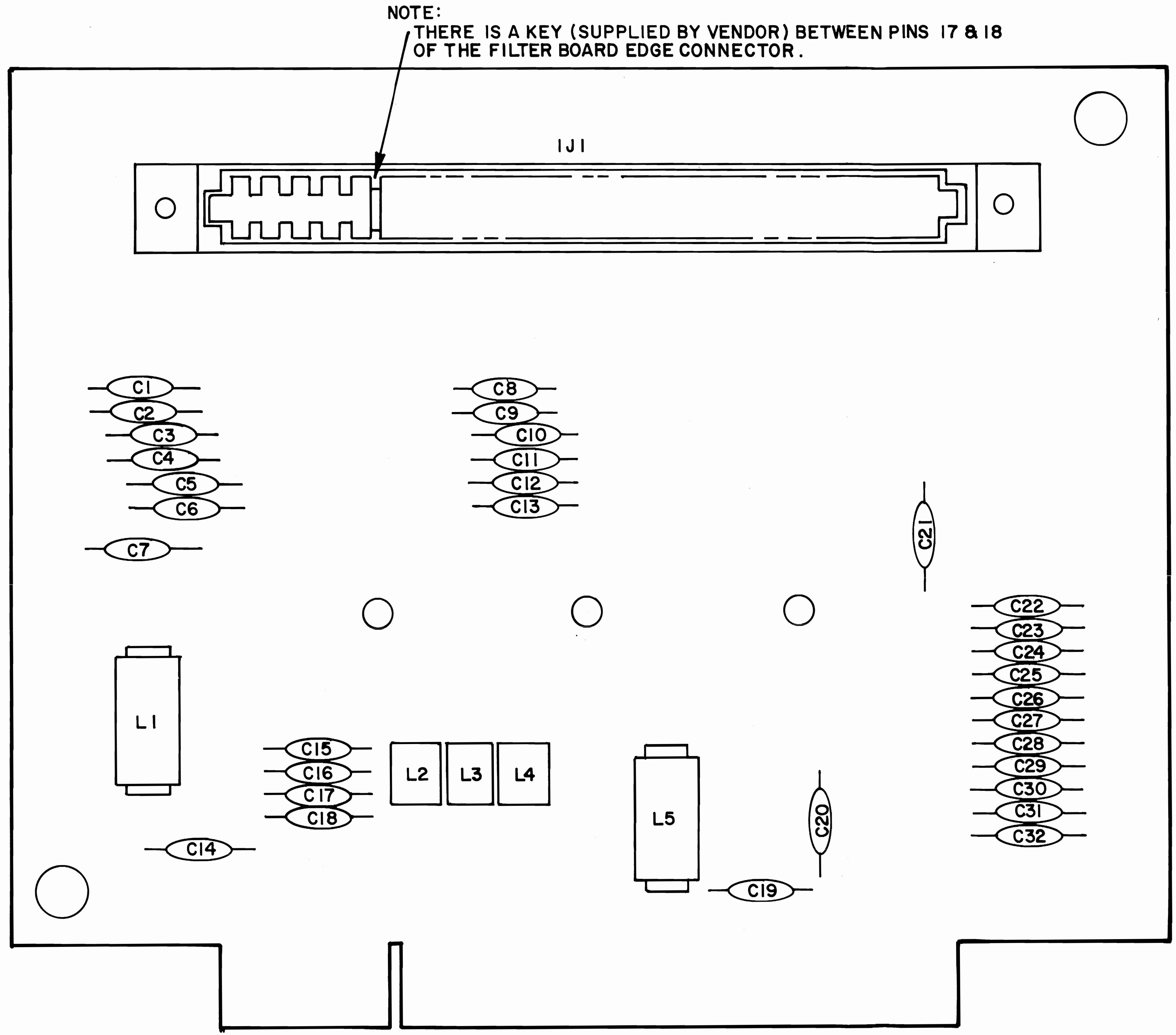
NOTES:

1. For 115VAC, 3A fuse and 130V varistor 5017-09044 are used.
2. For 230VAC, 1A fuse and 275V varistor 5017-09063 are used.
3. Jumper wires on 6P1 shown with solid lines are connected for 115VAC operation. Only the one shown with a dashed line is connected for 230VAC operation.
4. For low-line conditions (103.5 or 207VAC) move WHT-RED wire from 6T1-3 to 6T1-2 and move WHT-RED and WHT-BLU wires from 6T1-7 to 6T1-6.
5. For high-line conditions (132 or 264VAC) move WHT-RED wire from 6T1-3 to 6T1-4 and move WHT-RED and WHT-BLU wires from 6T1-7 to 6T1-8.
6. Secondary voltages shown (3%) are with 115/230VAC input.
7. Transformer Part No. 55610-09658-00.

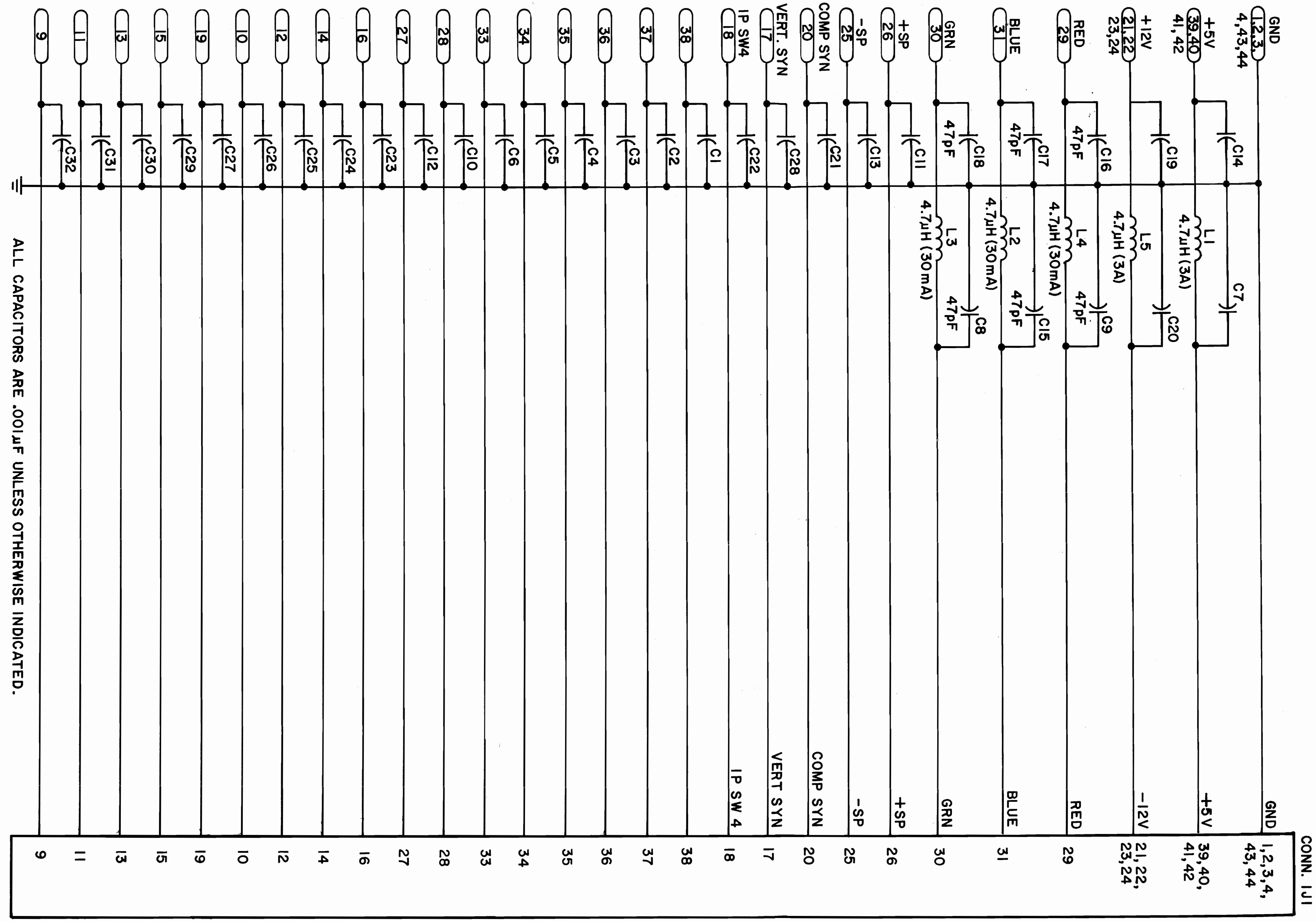
Power Wiring Diagram



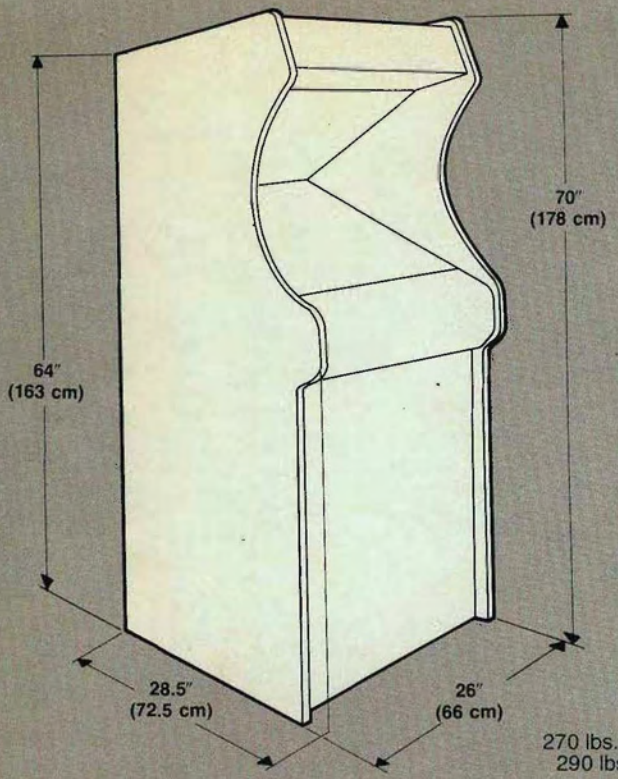
44-PIN
1J1
1P1
COMP SYNC
GROUND
BLUE
RED
GREEN
AUDIO
AUDIO
COIN B
(NOTE USED)
COIN A
GROUND
ID-6
ID-8
ID-11
ID-15
IE-15
IE-11
VIO-WHT
BLK
VIO-BLU
VIO-RED
VIO-GRN
BLK-RED
RED-BLK
WHT-BLU
ORN-BLK
ORN-BRN
ORN-RED
ORN
ORN-YEL
ORN-GRN
ORN-BLU
10-PIN
5P2
3-PIN
P201
6-PIN
P202
MONITOR
3-PIN
6J3
6P3
SPEAKER (NOTE)
15-PIN
8J2
8P2
YEL-WHT
8D1
8SW1 RIGHT COIN
8D2
8SW2 LEFT COIN
WHT-YEL
WHT
GRY
COIN COUNTER
BLK-ORN
RED
COIN LOCKOUT
(EARLY MODELS)
15-PIN
7J1
7P1
#22
7SW1
THROTTLE
7SW2
BRAKE
RIGHT
LEFT
7SW5
2-PLAYER START
7SW6
1-PLAYER START
6-PIN
4J3
4P3
POWER SUPPLY
WHT-YEL
YEL
6.3VAC
PIN
4P2
4J2
+5VDC
GRY #18
POWER SUPPLY GND
+27V
BLK-ORN
7-PIN
12P1
12J1
NC
C1
.01
Q4
2N4401
R8
10K
D4
IN4148
R7
180Ω
Q2
2N4401
R4
10K
D2
IN4148
R3
180Ω
Q1
2N4401
R2
10K
D1
IN4148
R1
180Ω
Q3
2N4401
R6
10K
D3
IN4148
R5
180Ω
D
E



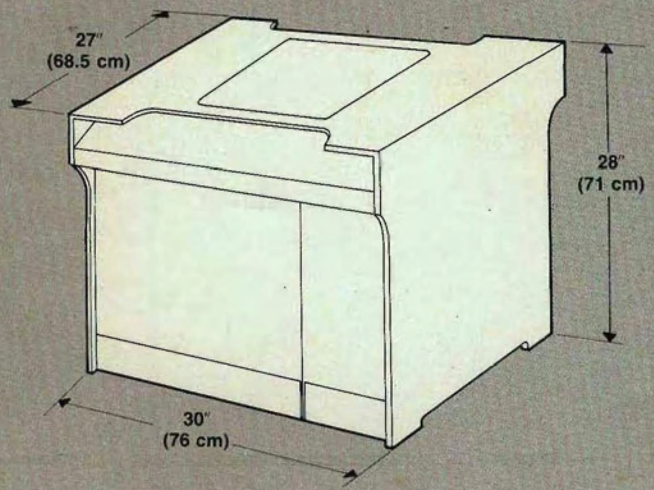
Filter Board Assembly Drawing.



Filter Board Schematic Diagram.



UPRIGHT
Weight
270 lbs. (122.5 kg.) uncrated
290 lbs. (131.5 kg.) crated



COCKTAIL TABLE
Weight
205 lbs. (93 kg.) uncrated
220 lbs. (100 kg.) crated

POWER REQUIREMENTS
115/230 VAC Nominal, 50/60Hz
@1.8/0.9A 207W
Normal Line = 98-126VAC
196-252VAC
High Line* = 113-145VAC
226-290VAC
Low Line* = 88-113VAC
176-226VAC
*Transformer jumpers required. See service manual.

ENVIRONMENT
Operating Temperature
0° to +45°C ambient
(+32° to +113°F)

Storage Temperature
−5° to +60°C ambient
(+23° to +140°F)
80% RH at 40°C (104°F), non-condensing

MONITOR
19″ Color Raster*
non-interlaced
UL, CSA & DHHS Approved
*13″ monitor on cocktail and mini-upright models

VIDEO SYSTEM
Program:
24K BYTES ROM
2K BYTES Scratch RAM
Character:
24K BYTES ROM
256 BYTES RAM
Scrolling Video:
24K BYTES ROM
4K BYTES RAM

SOUND SYSTEM
6808 Microprocessor
4K BYTES ROM
Two AY-3-8910 Sound Generators

JOYSTICK
2-way optical-digital

Specifications subject to change without notice.

SERVICE
For the back-up that keeps you out-front, call Williams toll-free at 800/621-125.
In Illinois, call toll-free at 800/572-1324.

Warning—This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been certified to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to correct the interference.

Williams® ELECTRONICS, INC.
3401 N. California Ave., Chicago, IL 60618
(312) 267-2240, Telex 253095